

Long Live the Tortilla!

If you love Mexican food, you know that a burrito is only as good as its tortilla.

But as any savvy chef knows, keeping a wheat-flour tortilla fresh and tender, ready to accept a zesty filling of vegetables or meat, is not easy. It's a race against the clock to beat underlying chemical forces that cause the popular flat breads to become brittle and tasteless.

And as tortillas move into mainstream cuisine, more and more consumers are reaching for the versatile, circular breads in their cupboards—only to find them past their prime. Aiming to please customers and curb losses, the \$5 billion tortilla industry is trying to produce tortillas that will stay fresh for up to 25 days.

ARS cereal chemist George L. Lookhart is conducting research that may someday put the brakes on staling—a process not easily described, involving terms like “protein matrix,” “starch granules,” and “starch retrogradation.” He's trying to determine how and why staling happens, something that scientists have been struggling to explain for more than 150 years.

“What we have accomplished,” says Lookhart, “is being able to predict whether a particular wheat flour will yield a good tortilla.”

And what makes the perfect tortilla? One that is about 2 mm thick and evenly opaque, with ample diameter and at least a 3-week shelf life.

Lookhart and his colleagues at the Hard Winter Wheat Quality Laboratory, in Manhattan, Kansas, have developed a laboratory-scale method that can predict whether a flour type will yield that ideal tortilla.

“With just a small amount of flour from early-generation wheat plants,” Lookhart says, “the test allows breeders to use small-scale, lab-produced tortillas to compare and distinguish



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How to keep wheat flour tortillas (the soft, white tortillas shown here) fresh is the subject of ARS studies on staling.

tortilla quality in wheat breeding lines.”

Wheat Wraps Get Stressed Out

In his laboratory, Lookhart submits strips of tortillas to various stress tests. He uses a texture analyzer to examine the physical and chemical changes that occur in 1- to 20-day-old tortillas.

“In one test, we basically stretch several strips from a single tortilla across a plate. Then we measure the forces—how the strips relax or at what level they break,” he explains.

The results of such tests reveal how strong the gluten proteins in a wheat flour are. With the right amount and quality of gluten, a wheat tortilla can endure the stress of being rolled, and it won't crack.

“On the other hand, if the gluten is too strong, the tortilla will have too much

spring—shrinking in on itself and losing diameter when the tortilla press is released from the dough,” Lookhart says.

The new tortilla test could lead to development of wheat varieties that have just the right gluten strength and protein makeup to be grown exclusively for tortilla production.

And what about staling? “At the heart of the staling process,” says Lookhart, “is moisture movement throughout the tortilla via the protein matrix and starch molecules.” Next, Lookhart plans to examine the chemistry of the staling process in other grains, like sorghum.—By **Erin Peabody**, ARS.

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